**APPENDIX B**
STATEMENT OF WORK FOR
REMEDIAL INVESTIGATION AND FEASIBILITY STUDY
**BERRY'S CREEK STUDY AREA**
BERGEN COUNTY, NEW JERSEY

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## I. INTRODUCTION

A. The purpose of this Remedial Investigation/Feasibility Study ("RI/FS") for the Berry's Creek Study Area (BCSA) is to characterize the nature and extent of contamination as provided in this SOW and evaluate remedial alternatives that mitigate potential human health and ecological risks associated with the biouptake and environmental fate and transport of chemicals from historical and on-going sources of hazardous substance releases from various facilities, while taking into account other sources of chemical and non-chemical stressors and relevant background conditions. The RI and FS are interactive and may be conducted concurrently so that the data collected in the RI influences the development of remedial alternatives in the FS, which in turn affects the data needs and the scope of treatability studies, if needed. This iterative and adaptive approach is appropriate based on the necessary integration of numerous off-property assessments and the potential impacts of numerous other past and on-going sources (outfalls, non-point sources, and sediment sources) in the BCSA.

B. Respondents shall conduct this RI/FS and shall produce draft reports that are in accordance with this statement of work ("SOW"), the Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA (U.S. EPA, Office of Emergency and Remedial Response, October 1988) and the "Contaminated Sediment Remediation Guidance for Hazardous Waste Sites" (U.S. EPA, Office of Emergency and Remedial Response, December 2005 and any other relevant literature that EPA uses in conducting an RI/FS, as well as any additional requirements in the Administrative Order. The RI/FS Guidance describes a report format and the report content, although adaptations will be required to match the specific needs of a megasite evaluation of a watershed study area. Respondents shall furnish all necessary personnel, materials, and services needed for, or incidental to, the performance of the RI/FS, except as otherwise specified in the administrative order.

C. Under a separate Administrative Settlement Agreement and Order On Consent for Scoping Activities (U.S. EPA Index No. II-CERCLA-2007-2006), the Respondents agreed to conduct RI/FS Scoping Activities for the BCSA. The purpose of the Scoping Activities is to further advance the understanding of the Study Area to support the completion of preliminary conceptual site models (CSMs) and the refinement of study questions that must be addressed by the BCSA RI/FS in order to achieve its purpose. Results of the Scoping Activities will be incorporated into the RI/FS as they become available.

D. At the completion of the RI/FS for the Site, EPA will be responsible for the selection of the remedy for the Site and will document the selection in a ROD. The remedial action alternative selected by EPA will meet the cleanup standards specified in CERCLA Section 121. That is, the selected remedial action will be protective of human health and the environment, will be in compliance with, or include a waiver of, applicable or relevant and appropriate requirements of other laws, will be cost-effective, will utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable, and will address the statutory preference

for treatment as a principal element. An adaptive site management approach shall be considered, as the types of remedial actions are likely to vary across the study area and more than one remedial phase is likely given the size and complexity of the Site. The final RI/FS report (including the baseline risk assessment reports), as adopted by EPA, will, with the administrative record, form the basis for the selection of the remedy for the Site and will provide the information necessary to support the development of the ROD.

E. As specified in CERCLA Section 104(a)(1), as amended by SARA, EPA will provide oversight of the Respondent's activities throughout the RI/FS. Respondents shall support EPA's initiation and conduct of activities related to the implementation of oversight activities.

## II. TASK I - RI/FS WORK PLAN

A. The RI/FS is conducted to gather sufficient data and information necessary to characterize the nature and extent of contamination and the fate and transport and biouptake of contaminants at the Site in order to support the selection of a remedy for the Site that will reduce or eliminate risks to human health or the environment associated with hazardous substance contamination at the Site. Respondents shall follow the Uniform Federal Policy for Implementing Quality Systems (UFP-QS), EPA-505-F-03-001, March 2005 or newer, Uniform Federal Policy for Quality Assurance Project Plans (UFP-QAPP), Parts 1, 2 and 3, EPA-505-B-04-900A, B and C, March 2005 or newer, and other guidance documents referenced in the aforementioned guidance documents. The UFP documents may be found at: http://www.epa.gov/fedfac/documents/qualityassurance.htm . In addition, the guidance and procedures located in the EPA Region 2 DESA/HWSB web site: http://www.epa.gov/region02/qa/documents.htm, as well as other OSWER directives and EPA Region 2 policies should be followed as appropriate. Subsequent amendments to the above, upon notification by EPA to Respondents of such amendments, shall apply only to procedures conducted after such notification.

B. The RI/FS achieves its objectives by determining the horizontal and vertical distribution and concentrations of hazardous substances in the surface water, sediments, wetlands and biota, their association with the Site, as well as the fate and transport and biouptake of contaminants within the Site. A specific set of BCSA study questions will be refined based on those initially identified in the Framework Document to guide the strategic design of the field studies and subsequent analyses. The RI/FS will be designed to take into account the urban nature of the watershed and the residual effects of past and current conventional parameter stressors in addition to the hazardous substances that are the focus of the RI/FS.

C. Work sessions between the Respondents and the EPA will be used to facilitate discussion of technical issues and analyses throughout the RI/FS process.

D. Respondents shall prepare a Work Plan for the RI/FS using the Framework Document or similar work that addresses the study questions and provides the data needs, taking into account the available information for the BCSA and the results of the Scoping Activities that are available at the time the Work Plan is prepared.

E. Before preparing the Work Plan for RI/FS activities, Respondents should review the existing data for the Site.

F. Respondents will have conducted several detailed site reconnaissance visits to the Site (initiated as a Scoping Activity) prior to preparing the Work Plan to assist in developing a conceptual understanding of sources and areas of contamination as well as potential exposure pathways and receptors at the Site. This information will be utilized to better define the project and to determine the extent of additional data necessary to characterize the Site, better define potential ARARs, and narrow the range of preliminarily identified remedial alternatives.

G. The Respondents have reviewed the Framework Document, collected and analyzed existing data, and conducted visits to the Site, and will develop a Work Plan pursuant to this SOW. Project planning activities include those tasks described below as well as developing a quality assurance project plan and identifying health and safety protocols.

H. RI/FS Work Plan and Schedule. Within one hundred and twenty (120) days of the Effective Date of this Settlement Agreement, Respondents shall submit to EPA a detailed Work Plan for the completion of the RI/FS. The RI/FS Work Plan shall include, among other things, a detailed schedule for RI/FS activities at the Site. If EPA disapproves, or requires revisions to, the RI/FS Work Plan in whole or in part, Respondents shall amend and submit to EPA a revised Work Plan which is responsive to the EPA comments, in accordance with Section XI of this Settlement Agreement. The RI/FS Work Plan shall include:

1. Quality Assurance/Quality Control Project Plan ("QAPP"), which shall be prepared in accordance with the Uniform Federal Policy for Implementing Quality Systems (UFP-QS), EPA-505-F-03-001, March 2005 or newer, Uniform Federal Policy for Quality Assurance Project Plans (UFP-QAPP), Parts 1, 2 and 3, EPA-505-B-04-900A, B and C, March 2005 or newer, and other guidance documents referenced in the aforementioned guidance documents and which shall include the following elements:

    a. A detailed description of the sampling, analysis, and monitoring that shall be performed during the RI/FS, consistent with this Administrative Order. At a minimum, the QAPP shall provide the following:

    b. A plan for the delineation of contamination in the surface water;

    c. A plan for the delineation of contamination in the sediments and

d. A plan for the determination of contaminant levels in biota found at the Site.

2. All sampling, analysis, data assessment, and monitoring shall be performed in accordance with the guidance provided at http://www.epa.gov/fedfac/documents/qualityassurance.htm, the guidance and procedures located in the EPA Region 2 DESA/HWSB web site: http://www.epa.gov/region02/qa/documents.htm, other OSWER directives and EPA Region 2 policies, as appropriate, or an alternate EPA-approved test method, and the guidelines set forth in this Administrative Order. All testing methods and procedures shall be fully documented and referenced to established methods or standards.

a. The QAPP shall also specifically include the following items:

i. An explanation of the way(s) the sampling, analysis, testing, and monitoring will produce data for the RI/FS ;

ii. A detailed description of the sampling, analysis, and testing to be performed, including sampling methods, analytical and testing methods, sampling locations and frequency of sampling;

iii. A map depicting sampling locations; and

iv. A schedule for performance of specific tasks.

b. In the event that additional sampling locations, testing, and analyses are utilized or required, Respondents shall submit to EPA an addendum to the QAPP for approval by EPA.

c. In order to provide quality assurance and maintain quality control with respect to samples to be collected, Respondents shall ensure the following:

i. Quality assurance and chain-of-custody procedures shall be performed in accordance with standard EPA protocol and guidance, including the guidance provided in the EPA Region 2 Quality Assurance Homepage, and the guidelines set forth in this Order.

ii. The laboratory to be used must be specified. If the laboratory participates in the Contract Laboratory Program ("CLP") for the analysis to be performed for this investigation, then project-specific Performance Evaluation ("PE") samples will not be required, as CLP laboratories run EPA PEs on a quarterly basis. If the proposed laboratory does not participate in the CLP for the analyses required, PE samples must be analyzed to demonstrate the

capability to conduct the required analysis prior to being approved for use. Once a non-CLP laboratory has been selected, the laboratory should submit a copy of their Laboratory Quality Assurance Program Plan ("LQAPP") to EPA for review and approval.

For any analytical work performed, including that done in a fixed laboratory, in a mobile laboratory, or in on-site screening analyses, Respondents must submit to EPA a Non-CLP Superfund Analytical Services Tracking System form for each laboratory utilized during a sampling event, within thirty (30) days after acceptance of the analytical results. Upon completion, such documents shall be submitted to the EPA Project Coordinator, with a copy of the form and transmittal letter to:

Regional Sample Control Center Coordinator
U.S. EPA Region 2
Division of Environmental Science & Assessment
2890 Woodbridge Avenue, Bldg. 209, MS-215
Edison, NJ 08837

iii. The laboratory utilized for analyses of samples must perform all analyses according to accepted EPA methods as documented in the Contract Lab Program Statement of Work for Organic Analysis, (OLM04.2) or the latest revision, and the Contract Lab Program Statement of Work for Inorganic Analysis, (ILM05.2) or the latest revision, or other EPA approved methods.

iv. Unless indicated otherwise in the approved QAPP, within 60 days of receipt from the laboratory, all data shall be validated.

v. Submission of the validation package (checklist, report and Form Is containing the final data) to EPA, prepared in accordance with the provisions of Subparagraph vi., below.

vi. Assurance that all analytical data that are validated as required by the QAPP are validated according to the procedures stated in the EPA Region II Contract Lab Program Organics Data Review and Preliminary Review (SOP #HW-6, Revision 12), dated March 2001, or the latest revision, and the "Evaluation of Metals Data for the Contract Laboratory Program (SOP #HW-2, Revision 11), dated January 1992 or the latest revision, or EPA-approved equivalent procedures. Region 2 Standard Operating Procedures are available at: http://www.epa.gov/region02/desa/hsw/sops.htm

vii. Unless indicated otherwise in the QAPP, Respondents shall require deliverables equivalent to CLP data packages from the laboratory for analytical data. Upon EPA's request, Respondents shall submit to EPA the full documentation (including raw data) for this analytical data. EPA reserves the right to perform an independent data validation, data validation check, or qualification check on generated data.

viii. Respondents shall insert a provision in their contract(s) with the laboratory utilized for analyses of samples, which will require granting access to EPA personnel and authorized representatives of the EPA for the purpose of ensuring the accuracy of laboratory results related to the Site.

3. A Health and Safety Plan ("HSP"), which shall conform to 29 CFR §1910.120, OSHA Hazardous Waste Operations Standards, and the EPA guidance document, Standard Operating Safety Guidelines (OSWER, 1988).

4. A Data Management Plan ("DMP"), shall identify the protocol for managing databases and geographic information systems ("GIS") data, and shall assimilate and integrate the historical data and field data. The database system shall comply with the EPA standard-electronic format, following the instruction provided in the "Electronic Data Deliverable Specification Manual, Version 2.1" (or the latest revision), unless an alternate format is proposed by the Respondents' and accepted by the EPA.

I. Following approval or modification by EPA in accordance with this Settlement Agreement, the RI/FS Work Plan shall be deemed to be incorporated into this Settlement Agreement by reference.

## III. TASK II - STAKEHOLDER INVOLVEMENT

EPA will develop a Site-specific Stakeholder Involvement Plan and make revisions to this plan as necessary and in accordance with EPA guidance and the NCP. To the extent requested by EPA, Respondents shall provide information relating to the work required hereunder to the public. As requested by EPA, Respondents shall participate in the preparation of appropriate information disseminated to the public; participate in public meetings, which may be held or sponsored by EPA, to explain activities at or concerning the Site; and procure a suitable location for public meetings, as needed. Respondents should communicate their activities with the Meadowlands Environmental Research Institute (MERI) as necessary to minimize redundancies in the compilation of information and facilitate sharing of information on activities in the BCSA that can influence the Respondents preparation of the RI/FS and subsequent remedy.

## IV. TASK III - SITE CHARACTERIZATION

Following EPA's written approval or modification of the RI/FS Work Plan, Respondents shall implement the provisions of the RI/FS Work Plan to characterize the nature, quantity, concentrations, and fate and transport of hazardous substances, pollutants, or contaminants in connection with the Site.

A. As part of the investigations of the Site, Respondents shall perform the activities described in this task. The overall objective of site characterization is to describe areas of the Site that may pose a threat to human health or the environment. Surface and subsurface pathways of migration will be defined. Respondents shall identify the sources of contamination and define the loading of hazardous substances from the sources of contamination to the Berry's Creek waterways and marshes, including their physical and chemical constituents. The nature and extent of hazardous substances in Berry's Creek waterways and marshes will be identified also. Concentrations at the Site will be compared to background and urban reference area levels, as well as literature toxic effects levels. Using these data and information, contaminant fate and transport is then determined and projected.

The Framework Document provides additional descriptions of work elements that will be incorporated into the RI/FS. The RI for the Site will be conducted according to a schedule that will be submitted as part of the Work Plan (See Paragraph II H., above.) Site characterization activities will be conducted iteratively. The RI will be divided into three phases that will track a three year schedule of site characterization (unless the schedule is extended by the EPA) to ensure characterization of the range of conditions and to initiate long term monitoring for trend analysis. Details of the sampling program and the implementation schedule will be described in the Work Plan. Respondents shall utilize information from completed site characterization efforts to propose modifications to the work specified in the initial Work Plan, as necessary to satisfy the objectives of the RI/FS. It is anticipated that the first phase of Remedial Investigation activities will emphasize characterization of BCSA hydrodynamics, initiating routine monitoring and obtaining an assessment of the horizontal distribution of Chemicals of Potential Concern (COPCs) in surface water, sediment and biota in the primary waterways of the BCSA. The design of sampling will be based on detailed review of the earlier investigations and other Scoping Activities. The second phase is expected to be a more extensive site characterization program that will include continuation of the program initiated in year one, plus toxicity testing, sampling of the marshes and coring to establish the vertical extent of COPCs to the extent necessary to support the FS alternatives analysis, and other analyses to complete the conceptual site models, support development of models pursuant to the modeling plan, and support development of the risk assessments. The third phase is expected to continue a routine monitoring component and include sampling necessary to fill any data gaps and needs to complete the risk assessments and detailed analysis of remedial alternatives, in addition to any Treatability Studies that may be necessary. The FS will be initiated the first year and parallel the RI in an iterative manner as specified in the Tasks IV, VIII and X.

B. During the field work phase of the RI/FS, field data are collected and analyzed to provide the information required to accomplish the objectives of the study, consistent with the QAPP and health and safety plan. Respondents shall notify EPA at least fourteen (14) days in advance of the field work regarding the planned dates for field activities, including ecological field surveys, field lay out of the sampling locations, excavation, initiating sampling, installation and calibration of equipment, and initiation of analysis and other field investigation activities, except for sampling that is to coincide with specified storm flows or storm tides. In addition to the deliverables below, Respondents shall provide a monthly progress report and participate in meetings with EPA at major milestones in the RI/FS process in accordance with Section X of the Administrative Agreement and Order.

Respondents shall provide EPA with quarterly updates of unvalidated analytical data pursuant to the QAPP, in the electronic format required by EPA. Validated analytical data shall also be provided to EPA quarterly, showing the locations, media and results, as described in the Data Management Plan. In addition, Respondents shall establish a project web site for the purpose of sharing data, reports, and other documents and information with access to material varied according to the status of material in the review and acceptance/approval process. Analytical data shall be validated within sixty (60) days of receipt of data, unless otherwise indicated in the approved QAPP. Respondents shall notify EPA in the subsequent monthly progress report of the completion of field activities.

1. Field Investigation

The field investigation includes the gathering of data to define the Site's physical and biological characteristics, sources of contamination, and the nature and extent of contamination at the Site. These activities shall be performed by the Respondent in accordance with the RI/FS Work Plan and QAPP. At a minimum, this shall address the following:

a. Implement and Document Field Support Activities

Respondents shall initiate field support activities following approval of the RI/FS Work Plan and QAPP. Field support activities may include scheduling, and procuring equipment, office space, laboratory services, and/or contractors. Respondents shall initiate time critical field support activities, such as procurement of the primary contractors needed to prepare the Work Plan and QAPP and obtaining access to the Site, prior to approval of the RI/FS Work Plan and QAPP. Respondents shall provide EPA with reasonable notice prior to initiating field support activities so that EPA may adequately schedule oversight tasks. Respondents shall also notify EPA of the completion of field support activities in the monthly progress report.

b. Investigate and Define Site Physical and Biological Characteristics

Respondents shall collect data on the physical and biological characteristics of the Site and its surrounding areas, and specific physical characteristics identified in the Work Plan. Reference areas will be identified, to the extent not already completed during the Scoping Activities, which match the BCSA watershed in size, land use, and hydrology among other parameters, to the extent practicable and applicable. This information will be ascertained through a combination of GIS information resources, physical measurements, observations, and sampling efforts and will be utilized to define potential transport pathways and human and ecological receptor populations. In defining the physical characteristics of the Site, Respondents shall also obtain sufficient engineering data for the projection of contaminant fate and transport, and development and screening of remedial action alternatives, including information to assess treatment technologies.

c. Define Potential Sources of Contamination

Based on data collected from surface water and sediment, Respondents shall identify the sources of contamination to Berry's Creek, to the extent practicable. For areas of contaminated sediment within Berry's Creek, or wetlands and tributaries adjacent to the creek not already subject to investigation under other programs, permits, orders, or agreements, the areal extent and depth of contamination shall be determined, as necessary for remedial alternatives evaluation. Physical characteristics, chemical constituents and concentrations will be determined for all known and discovered areas of contamination. Respondents shall conduct sufficient sampling to characterize the contaminant sources within the Berry's Creek Study Area to meet the DQOs in the EPA approved QAPP. For contamination originating from upland properties, Respondents shall identify whether the source is potentially still contributing contamination to Berry's Creek or adjacent wetlands and tributaries. Upland properties that are still sources of contamination to the creek will be referred by the USEPA to the appropriate agency in order to further evaluate and address the source conditions. Nothing in this Statement of Work requires characterization of the nature and extent of source conditions or contaminants in or on upland properties. Should the Respondents, through the course of this investigation, identify previously unknown sources of ongoing contamination or identify ongoing releases that were thought to have been previously mitigated, then they shall notify EPA of those sources. Respondents shall provide sufficient documentation such that EPA can refer the ongoing source to the appropriate agency to be addressed.

Defining the source of contamination will include analyzing the potential for contaminant release (e.g., long term leaching from sediment or soil),

contaminant mobility and persistence, and characteristics important for evaluating remedial actions, including information to assess treatment technologies.

d. Describe the Nature and Extent of Contamination

Respondent shall gather information to describe the nature and extent of contamination during the field investigation. To describe the nature and extent of contamination, Respondents shall utilize the information on the Site's physical and biological characteristics and sources of contamination to refine conceptual site models that illustrate the relationships among sources, contaminants, and receptors in the BCSA. Respondents shall then implement an iterative monitoring program and any study program identified in the RI/FS Work Plan (which includes the QAPP) such that by using analytical techniques sufficient to detect and quantify the concentration of contaminants, the migration of contaminants through the various media at the Site can be determined. In addition, Respondents shall gather data for calculations of contaminant fate and transport. This process is continued until the area and depth (as necessary for detailed remedial alternative evaluation) of contamination are known to meet DQOs in accordance with the EPA approved QAPP. The information on the nature and extent of contamination will be used to determine the level of risk presented by the Site. Respondents shall use this information to help to determine aspects of the appropriate remedial action alternatives to be evaluated.

2. Data Analysis

Evaluate Site Characteristics

Respondents shall analyze and evaluate the data to describe: (1) physical, chemical and biological characteristics at the Berry's Creek Study Area, (2) contaminant source characteristics, (3) nature and extent of contamination, (4) contaminant fate and transport and (4) bioavailability. The preceding analysis will include descriptions of the roles of salinity, dissolved oxygen, and sediment transport/deposition. Results of the Berry's Creek Study Area's physical characteristics, source characteristics, and extent of contamination analyses are utilized in the refinement of conceptual site models, analysis of contaminant fate and transport, and bioavailability assessment. The evaluation will include the actual and potential magnitude of releases from the sources, sequestration mechanisms and horizontal and vertical spread of contamination as well as mobility and persistence of contaminants.

A modeling plan shall be submitted with the Phase 1 Report. Prior to the submission of the modeling plan, the Respondents shall present the results of any preliminary modeling conducted by the Respondents and their analysis of

modeling needs to EPA in a work session. The modeling plan shall be revised based on EPA comments. Data collected during the RI should support the development of models based on the modeling plan. Programming, including any proprietary programs, shall be made available to EPA (with no waiver of intellectual property rights) together with a sensitivity analysis. The modeling will be conducted by the Respondents in accordance with the approved modeling plan. EPA reserves its rights to conduct its own modeling or complete models initiated by the Respondents. If EPA conducts its own modeling efforts, it will provide to the Respondents, in writing, justification for conducting such work. Respondents shall collect and analyze the data necessary for developing, running, validating and verifying the models. All data collected under this agreement will be made available to EPA in a timely manner as it is generated during the RI.

EPA may provide modeling information for the risk assessments and alternatives analysis, to the extent EPA conducts applicable modeling. Respondents shall agree to discuss any data gaps identified by the EPA and then collect data that are necessary to complete the baseline risk assessment. (See Guidance for Data Usability in Risk Assessment - Publication # 9285.7-09A, April 1992.) Also, this evaluation shall include any information relevant to characteristics of the Site necessary for evaluation in the baseline risk assessment of the need for remedial action and for the development and evaluation of remedial alternatives. (See Risk Evaluation of Remedial Alternatives (Part C) - OSWER Directive 9285.7-01C, December 1991.) Analysis of data collected for characterization of the Site will meet the DQOs developed in the QA/QC plan (or revised during the RI).

3. Data Management Procedures

Respondents shall consistently document the quality and validity of field and laboratory data compiled during the RI.

a. Document Field Activities

Information gathered during characterization of the Site will be consistently documented and adequately recorded by Respondents in well-maintained field logs and laboratory reports. The method(s) of documentation must be specified in the work plan and QAPP. Field logs or dedicated field log-books must be utilized to document observations, measurements, and significant events that have occurred during field activities. Laboratory reports must document sample custody, analytical responsibility, analytical results, adherence to prescribed protocols, nonconformity events, corrective measures, and/or data deficiencies.

b. Maintain Sample Management and Tracking

Respondents shall maintain field reports, sample shipment records, analytical results, and QA/QC reports to ensure that only validated

analytical data are reported and utilized in the evaluation of remedial alternatives. Analytical results developed under the work plan will not be included in the site characterization reports for the Site unless accompanied by, or cross- referenced to, a corresponding QA/QC report. In addition, Respondents shall establish a data security system to safeguard chain-of-custody forms and other project records to prevent loss, damage, or alteration of project documentation.

4. Phase 1 Site Characterization Report and Work Plan Addendum (Phase 1 Report)

a. Schedule

Draft Phase 1 Report

In accordance with the schedule in the approved RI/FS Work Plan, Respondents shall submit a Draft Phase 1 Site Characterization Report and Work Plan Addendum (Phase 1 Report) that details the Phase 2 field work. Within fourteen (14) days after Respondents' submittal of the Draft Phase 1 Report, Respondents, upon EPA's request, shall make a presentation to EPA and the State on the findings of the Draft Phase 1 Report and discuss EPA's and the State's preliminary comments and concerns associated with the Draft Phase 1 Report.

Final Phase 1 Report

If EPA disapproves of or requires revisions to the Draft Phase 1 Report, in whole or in part, Respondents shall amend and submit to EPA a Final Phase 1 Report that is responsive to EPA's written comments in accordance with Section XI of the Settlement Agreement and Order.

b. The Phase 1 Report will review the investigative activities that have taken place, and describe and display data from the Berry's Creek Study Area documenting the location and characteristics of surface and subsurface features and contamination at the Berry's Creek Study Area including the affected medium, location, physical state, concentration of contaminants and quantity. In addition, the location, physical condition and varying concentrations of each contaminant throughout the waterways in each portion of the BCSA and the extent of contaminant migration in surface water and sediment through the BCSA will be documented. The report will provide refined DQOs, updated conceptual site models, a screening level ecological risk assessment, and determination of chemicals of concern. The Phase 1 Report will refine the study questions, identify data gaps and will detail the proposed Phase 2 sampling program, which will collect appropriate data to evaluate remedial actions for the Site. The Phase 1 Report will include results of:

i. Pre-RI/FS data will be reviewed to evaluate its utility in the RI/FS. Phase 1 Site Characterization data will be compared with historic data to support trend analysis, considering the data quality and other limitations of the historic data.

ii. Historical data review, including potential upland soil sites that are contributing loads to Berry's Creek.

iii. Low-resolution cores plus any required geotechnical and geochemical parameters.

iv. Integrative and discrete surface water samples, storm event sampling, and water column stratification plus any field parameter measurements and geochemical parameters. Results are required from the hydrology and hydrodynamic program, including time plots for each mooring station, freshwater flow into Berry's Creek, delineation of the salt gradient, and status of the operation and maintenance schedule of tidal gates throughout the BCSA. Results should be presented in a water budget context, incorporating the preliminary water budget analysis completed as part of Scoping Activities, to identify the impact of tides on the water quality and sediment transport dynamics of Berry's Creek and its tributaries; identify loading to and from Berry's Creek and the Hackensack River; evaluate correlations between water column COPC concentrations and suspended solids; and characterize the circulation and particle residence time in various portions of the creek.

v. Bathymetric maps and side-scan sonar mosaics, incorporating the results of the mapping work completed as part of the Scoping Activities, to identify water depth, submerged debris in waterways, and potential surface water runoff areas, incorporating the materials generated as part of the Scoping Activities. Images from the side-scan sonar will be provided along with a list of target areas for further core sampling, including debris fields and submerged obstacles. A map of sediment texture (delineated from the side-scan sonar) is required to identify potential scour and depositional areas. Core sampling will be initiated in Phase 1 to provide, in part, the basis for focusing the more detailed coring during Phase 2 and Phase 3 field work.

vi. Biological and ecological data plus any field measurements and geochemical parameters. A graphical presentation is required for the delineation of wetlands and other ecosystems. An inventory of flora and fauna, including benthic invertebrates, will be completed to identify ecologically-relevant receptors and endangered or

threatened species (initiated as a Scoping Activity). This inventory will provide an assessment of the health of the ecosystem, evaluate flora and fauna diversity (e.g., Shanon Weiner Diversity Index values), and identify the presence of native and intrusive species. The results of historic tissue sampling for key species will be analyzed to preliminarily estimate bioavailability and bioaccumulation of contaminations.

vii. Description of the regional groundwater flow and groundwater sampling to identify specific sources of potential concern and estimate contaminant loads from groundwater to the surface water, taking into account the tidal prism volume, other relevant factors, and the potential for significant impacts to the surface waters and sediments of the Berry's Creek waterways and marshes.

viii. Atmospheric deposition data review to evaluate if deposition is a significant component of the conceptual site model.

ix. Storm water runoff data to identify potential contaminant loads from soils to Berry's Creek and adjacent wetlands.

x. Stage 1A cultural resource investigation detailing the methodology employed to conduct the investigation, presenting the results of the work, providing conclusions on the archaeological sensitivity of the various portions of the Berry's Creek Study Area, and presenting recommendations for any warranted additional investigations. If no additional investigations of all or portions of the project area are warranted, such conclusion should be clearly stated in the report.

xi. Preliminary Interim Remedial Measure Evaluation

Respondents shall conduct an evaluation of Phase 1 data to consider if an Interim Remedial Measure ("IRM") or early action may be appropriate for a portion of the Berry's Creek Study Area. The evaluation shall identify any data or information that should be obtained during the Phase 2 site characterization to support the preparation of a Draft IRM Letter Report following Phase 2. Any data or information needs identified during the Preliminary IRM Evaluation shall be incorporated into the Phase 2 Sampling Proposal (Work Plan Addendum).

5. Fate and Transport Assessment

The Respondents will evaluate fate and transport and biouptake for the Berry's Creek Study Area. All fate and transport modeling shall be completed consistent with the modeling plan (Section IV.B.2., second paragraph).

6. Phase 2 Sampling Proposal (Work Plan Addendum)

The Respondents shall prepare a Work Plan addendum as part of the Phase 1 report. The second phase will be a more extensive site characterization program that will include continuation of the program initiated in year one, plus toxicity testing, sampling of the marshes and sediment coring to establish vertical extent of COPCs to the extent necessary to support the FS alternatives analysis, and other analyses to complete the conceptual site models and support development of the risk assessments. In addition, data gaps identified in the Phase 1 analysis shall be addressed with proposals to provide further for the identified data needs and fill data gaps. Sampling can include methods previously approved for Phase 1 and new methods to address conditions identified during Phase 1.

## V. TASK IV – FEASIBILTIY STUDY - IDENTIFICATION OF CANDIDATE TECHNOLOGIES AND POTENTIAL REMEDIAL ALTERNATIVES

The Feasibility Study will be completed in 3 phases to correspond with the phased approach to the RI. The first phase will be initiated at the end of the first year of field work and will include the identification of candidate technologies and general remedial alternatives. In the second phase (Task VIII), following the second year of field work, the data from each of the major segments of the study area will be evaluated to identify the range of alternatives that may be well suited to the conditions that dominate a particular study segment. Based on that analysis, data needs will be identified to support the completion of the detailed analysis of alternatives, including any Treatability Studies. Following the third year of site characterization and potential Treatability Studies, the third phase will be the preparation of the Feasibility Study Report, which will be primarily focused on the completion of the detailed analysis of alternatives.

Schedule: An Identification of Candidate Technologies Memorandum shall be submitted by Respondents within ninety (90) days of Respondents' submission to the EPA of the last set of validated analytical results from the Phase 1 field work. The candidate technologies identified shall include innovative treatment technologies (as defined in the RI/FS and sediment guidance) where appropriate. The listing of candidate technologies will cover the range of technologies required for alternatives analysis (Task VIII) and shall be presented in the context of potential remedial alternatives for each segment of the BCSA. In addition, data needs to support the subsequent development and screening alternatives shall be identified for use in designing the Phase 2 and 3 site characterization work. If EPA disapproves of or requires revisions to the technical memorandum identifying candidate technologies and potential remedial alternatives, in whole or in part, Respondents shall amend and submit to EPA a revised technical memorandum identifying candidate technologies which is responsive to the EPA comments in accordance with Section XI of the Settlement Agreement and Order.

## VI. TASK V – PHASE 2 SITE CHARACTERIZATION REPORT AND WORK PLAN ADDENDUM (Phase 2 Report)

The Phase 2 Site Characterization Report and Work Plan Addendum (Phase 2 Report) will include the presentation of the more extensive site characterization program of the second year of field work, which will include continuation of the program initiated in year one to establish trends in concentration data, plus the results of: toxicity testing, sampling of the marshes and coring to establish vertical extent of COPCs to the extent necessary to support the FS alternatives analysis, as well as other analyses to complete the conceptual site models and support development of the risk assessments.

Graphical presentations of data from low-resolution and high-resolution cores, plus any required geotechnical and geochemical parameters, will be provided for transects across the waterways and across the marshes. Data from high-resolution cores will be used to establish a geochronological history of chemicals and other stressors, estimate sedimentation rates and mixing layers, identify loading to Berry's Creek and Hackensack River, and identify potential sources of contamination. In addition, concurrently, the work on the human health risk assessment and ecological risk assessments will be advanced to subsequent management decision points.

The Respondents shall prepare a Work Plan addendum as part of the Phase 2 report. The third phase will continue a routine monitoring component and include sampling necessary fill any data gaps and needs to complete the risk assessments, modeling, and detailed analysis of remedial alternatives, in addition to any Treatability Studies that may be necessary. Data gaps identified in the Phase 2 analysis shall be addressed with proposals to address the identified data needs and fill data gaps. Sampling can include methods previously approved for Phase 1 and 2 and new methods to address conditions identified during Phase 2. Any QAPP revisions will be addressed in the addendum accordingly.

Upon EPA's request, the Respondents shall make a presentation to EPA and the State on the findings of the Draft Phase 2 Report and discuss EPA's and the State's preliminary comments and concerns associated with the Draft Phase 2 Report. The Work Plan Addendum will identify field investigations that are needed to fill data gaps and data needs related to the BCSA study area questions and FS data needs. In addition, the field work will include continuation of the program to establish trends in the concentration data.

Interim Remedial Measure Letter Report

Respondents shall prepare a draft letter report that will summarize relevant Phase 1 and Phase 2 data and evaluate whether an Interim Remedial Measure ("IRM") or early action is appropriate for the Berry's Creek Study Area. The analysis shall take into account the risk assessments completed up to the time of the IRM evaluation. If appropriate, the report will present potential remedial options and plans to reduce human health and ecological risks.

Respondents shall submit a Draft IRM Letter Report thirty (30) days after submitting the Draft Phase 2 Report. If EPA disapproves of or requires revisions to the Draft IRM Letter Report, in

whole or in part, Respondents shall amend and submit to EPA a Final IRM Letter Report that is responsive to EPA's written comments in accordance with Section XI of the Settlement Agreement and Order.

## VII. TASK VI - BASELINE RISK ASSESSMENT

Respondents shall prepare a Baseline Risk Assessment for the Site which shall be incorporated by the Respondents into the RI. Respondents shall provide EPA with the following deliverables:

A. Baseline Human Health Risk Assessment (BHHRA)

1. Potential cancer risks and non-cancer hazards to human health shall be identified and characterized in accordance with CERCLA, the NCP, and EPA guidance including, but not limited to, the RI/FS Guidance, "Land Use in the CERCLA Remedy Selection Process" (OSWER Directive No. 9355.7-04) and the definitions and provisions of "Risk Assessment Guidance for Superfund (RAGS)," Volume 1, "Human Health Evaluation Manual," (December 1989) (EPA/540/1-89/002). Other EPA guidance to be used in the development of risk assessments is provided in Appendix 1A.

2. Representative contaminants and associated concentrations in media including sediment, surface water and biota for the BHHRA shall be determined utilizing all currently available media-specific analytical data generated during the RI/FS.

3. Memorandum on Exposure Scenarios and Assumptions. Within ninety (90) days after receiving written EPA approval of the RI/FS Work Plan, Respondents shall submit a memorandum describing the exposure scenarios and assumptions, taking into account the present and reasonably anticipated future land use of the Site. The memorandum should include appropriate text describing the preliminary conceptual site models and exposure routes of concern for the Site, and include a completed RAGS Part D Table 1 and the process to develop any site-specific exposure parameters that may be warranted. The RAGS Part D Table 1 shall describe the pathways that will be evaluated in the BHHRA, the rationale for their selection, and a description of those pathways that will not be evaluated. In addition, the Memorandum shall include a completed RAGS Part D Table 4 describing the exposure pathway parameters with appropriate references to EPA's 1991 Standard Default Assumptions and updated guidance developed by EPA. If EPA disapproves, or requires revisions to, the memorandum, in whole or in part, such disapproval or required revisions shall be provided in writing with reasons for the disapproval or directions for revisions to make the submittal approvable. Respondents shall amend and submit to EPA a revised memorandum that is responsive to the EPA comments, within thirty (30) days of receiving EPA's comments.

4. Pathway Analysis Report ("PAR"). Respondents shall prepare and submit a PAR within sixty (60) days after receipt of the last set of validated data from the Phase 1 site characterization. An updated PAR will be prepared and submitted within sixty (60) days after receipt of the last set of validated data from the Phase 2 site characterization. The PAR shall be developed in accordance with OSWER Directive 9285.7-01D-1 dated December 17, 1997 (or more recent version), entitled, *Risk Assessment Guidelines for Superfund Part D* and other appropriate guidance in Appendix 1A and updated thereto. The PAR shall contain all the information necessary for a reviewer to understand how the risks at the Site will be assessed. The PAR will build on the Memorandum on Exposure Scenarios and Assumptions (see A.3 above) describing the risk assessment process and how the risk assessment will be prepared. The PAR shall include completed RAGS Part D Tables 2, 3, 5, and 6 as described below. Following completion of Phase 3, the PAR will be updated within sixty (60) days after receipt of the last validated data. The updated PAR must be reviewed and approved by EPA prior to the submission of the draft BHHRA.

   a. Chemicals of Concern (COC). The PAR shall contain all the information necessary for a reviewer to understand how the risks at the Berry's Creek Study Area will be evaluated.

      i. Respondents shall list the hazardous substances present in all sampled media (e.g., surface water, sediment, etc.) and COPCs as described in RAGS Part A.

      ii. Selection of COCs. Representative contaminants and associated concentrations in sample media for the major BCSA segments for the PAR shall be determined utilizing all currently available media-specific validated analytical data generated during the RI/FS. The selection of COCs shall follow RAGS Part A and before chemicals are deleted as COCs they shall be evaluated against the residential PRGs from Region IX. The COCs shall be presented in completed RAGS Part D Table 2 format.

      iii. Focused risk assessment of the primary exposure pathways and using the historic data and Phase 1 sampling data will be used to support a determination of the appropriate analytical parameters for Phase 2 and Phase 3 sampling in each of the major segments of the BCSA.

   b. Media Specific Exposure Point Concentrations. Using the chemicals selected in Table 2, this Table shall summarize the Exposure Point Concentrations for all COCs for the various media. The calculation of the Exposure Point Concentration shall follow the 1992 Guidance Document on the calculation of the 95% Upper Confidence Limit (UCL) on the Mean. In those cases where the 95% UCL of the mean exceeds the maximum concentration, the maximum shall be used as the EPC. In

addition, the central tendency exposure (CTE) shall be calculated and presented.

c. Toxicological Information.

This section of the PAR shall provide the toxicological data (e.g., Cancer Slope Factors, Reference Doses, Reference Concentrations, Weight of Evidence for Carcinogens, and adjusted dermal toxicological factors where appropriate) for the chemicals of concern. The toxicological data shall be presented in completed RAGS Part D Tables 5 and 6. The sources of data in order of priority are: EPA's Integrated Risk Information System (IRIS), contact with EPA's National Center for Environmental Assessment and Health Effects Assessment Summary Tables (HEAST)-1997. To facilitate a timely completion of the PAR, the Respondents shall submit a list of chemicals for which IRIS values are not available to EPA as soon as identified thus allowing EPA to facilitate obtaining this information from EPA's National Center for Environmental Assessment.

If EPA disapproves, or requires revisions to the PAR, in whole or in part, Respondents shall amend and submit to EPA a revised PAR that is responsive to EPA's written comments within thirty (30) days of receipt of EPA's comments.

d. As part of the IRM evaluation, the primary exposure pathways and COPCs will be evaluated to determine the magnitude of the risks associated with a particular condition and support the development of remedial action objectives for any action under consideration.

5. Baseline Human Health Risk Assessment of the RI Report. Within ninety (90) days of the completion of the Phase 3 data collection and EPA's approval of the PAR, whichever is later, Respondents shall submit to EPA a Draft BHHRA for inclusion in the RI. The submittal shall include completed RAGS Part D Tables 7 through 10 summarizing the calculated cancer risks and non-cancer hazards and appropriate text in the risk characterization with a discussion of uncertainties and critical assumptions (e.g., background concentrations and conditions). Respondents shall perform the BHHRA in accordance with the approach and parameters described in the approved Memorandum of Exposure Scenarios and Assumptions and the PAR describe above. Text and tables from these previously approved reports shall be included in the appropriate sections of the BHHRA.

If EPA disapproves of or requires revisions to the Draft BHHRA, in whole or in part, Respondents shall amend and submit to EPA a Final BHHRA that is responsive to EPA's written comments in accordance with Section XI of the Settlement Agreement.

B. Baseline Ecological Risk Assessment

1. As part of the Phase 1 Report, Respondents shall submit a Screening-Level Ecological Risk Assessment (SLERA) in accordance with current Superfund ecological risk assessment guidance (Ecological Risk Assessment Guidance for Superfund, Process for Designing and Conducting Ecological Risk Assessments [ERAGS], USEPA, 1997 [EPA/540-R-97-006]). EPA expects that the SLERA will be a short and qualitative assessment for the most part, based on the assumption stated below, that a full Baseline Ecological Risk Assessment will be required.

   If EPA disapproves of or requires revisions to the Draft SLERA, in whole or in part, Respondents shall amend and submit to EPA a Final SLERA that is responsive to EPA's written comments in accordance with Section XI of the Settlement Agreement.

2. Based on the existing data, it is assumed that a full Baseline Ecological Risk Assessment (BERA) will be required. Therefore, Respondents shall include in the Phase 1 Report a Scope of Work outlining the steps and data necessary to perform the BERA, including any amendments to the RI/FS Work Plan required to collect additional relevant data. If EPA disapproves, or requires revisions to, the BERA Scope of Work, in whole or in part, Respondents shall amend and submit to EPA a revised BERA Scope of Work that is responsive to EPA's written comments in accordance with Section XI of the Settlement Agreement. The BERA Scope of Work shall identify any RI/FS Work Plan amendments or addenda, including establishment of a schedule for review and approval of additional field work.

3. Respondents shall prepare and submit an Ecological Exposure Assessment Technical Memorandum within sixty (60) days after receipt of the last set of validated data from the Phase 2 site characterization. The Technical Memorandum shall present updated conceptual site models and evaluation of the exposure pathways specific in the various segments of the BCSA, including consideration of any differences in the measurement and assessment endpoints that are warranted across the Site. Data gaps shall be identified for incorporation into the Phase 3 site characterization.

4. Within ninety (90) days of the submission of the Phase 3 Report, Respondents shall submit a draft Baseline Ecological Assessment Report to EPA. Actual and potential ecological risks shall be identified and characterized in accordance with CERCLA, the NCP, and EPA guidance including, but not limited to, Ecological Risk Assessment Guidance for Superfund, Process for Designing and Conducting Ecological Risk Assessments, (1997) (EPA/540-R-97-006), ERAGS, dated June 5, 1997 (or most recent guidance).

   If EPA disapproves of or requires revisions to the Draft BERA, in whole or in part, Respondents shall amend and submit to EPA a Final BERA that is

responsive to EPA's written comments in accordance with Section XI of the Settlement Agreement.

Respondents shall evaluate and assess the risk to the environment posed by site contaminants. As part of this subtask, Respondents shall perform the following activities:

Draft Baseline Ecological Risk Assessment Report. Respondent shall prepare a draft Ecological Risk Assessment Report that addresses the following:

a. Hazard Identification (sources). Respondents shall review available information on the hazardous substances present at the site and identify the major contaminants of concern.

b. Dose-Response Assessment. Respondents shall identify and select contaminants of concern based on their intrinsic toxicological properties.

c. Characterization of the Berry's Creek Study Area and Potential Receptors. Respondents shall identify and characterize environmental exposure pathways for the major segments of the BCSA.

d. Select Chemicals, Ecologically-relevant Receptor Species, and Endpoints. In preparing the assessment, the Respondent shall select representative chemicals, ecologically-relevant species (several species which are present in BCSA (and urban reference areas) and ecologically-relevant based on dominance, keystone species, ecotypes, and sensitive to environmental contaminants), and endpoints on which to concentrate.

e. Exposure Assessment. The exposure assessment shall identify the magnitude of actual or potential environmental exposures, the frequency and duration of these exposures, and the routes by which receptors are exposed. The exposure assessment shall include an evaluation of the likelihood of such exposures occurring and shall provide the basis for the development of acceptable exposure levels. In developing the exposure assessment, Respondents shall develop reasonable maximum estimates and the central tendency of exposure for both current land use/hydrology/sediment transport conditions and potential land use/hydrology/sediment transport conditions at the Site.

f. Toxicity Assessment/Ecological Effects Assessment. The toxicity and ecological effects assessment shall address the types of adverse environmental effects associated with chemical exposures, the relationships between magnitude of exposures and adverse effects, and the related uncertainties for contaminant toxicity (e.g., weight of evidence for a chemical's carcinogenicity).

g. Risk Characterization. During risk characterization, chemical-specific toxicity information, combined with quantitative and qualitative information from the exposure assessment with measured levels of contaminant exposure levels or the levels predicted through environmental fate and transport modeling, as appropriate. These comparisons shall determine whether concentrations of contaminants at or near the Site are affecting or could potentially affect ecological receptors at a community or population level (or, for endangered and threatened species, at an individual level). The risk characterization shall use a weight of evidence approach to assess population-level risks and risks to individuals of special protection species associated with Site contaminants.

h. Respondent shall consider additional studies in the laboratory or field-designed to refine estimates of population-level risks for key receptors, for which uncertainties are relatively large. Studies shall be proposed to EPA for review and approval in accordance with the Settlement Agreement.

i. Identification of Limitations/ Uncertainties. Respondents shall identify critical assumptions (e.g., background/reference area concentrations and conditions) and uncertainties in the report.

j. Conceptual Site Models. Based on contaminant identification, exposure assessment, toxicity assessment, and risk characterization, Respondents shall develop conceptual models of the Site.

## VIII. TASK VII – PHASE 3 REPORT

Respondents shall prepare a Phase 3 Report for the Site that accurately establishes the Site's characteristics, such as the contaminated media, extent of contamination, and the physical boundaries of the contamination, to support evaluation of remedial alternatives. This report shall be a stand alone document that summarizes results of all field activities to characterize the Site, sources of contamination, and the fate and transport of contaminants. Pursuant to this objective, Respondents shall obtain the detailed data necessary to determine the key contaminants' movement and extent of contamination. The key contaminants must be selected based on persistence, mobility, and bioavailability in the environment and their relative degree of risk. Respondents shall use existing standards and guidelines such as surface water standards, water quality criteria, and other criteria accepted by EPA as appropriate for the situation that will be used to evaluate effects on human and ecological receptors. Within fourteen (14) days after Respondents' submittal of the Draft Phase 3 Report, Respondents, upon EPA's request, shall make a presentation to EPA and the State on the findings of the Draft Phase 3 Report.

The Phase 3 Report shall be the equivalent of a Remedial Investigation (RI) Report, although several components of an RI will be broken out and submitted as separate reports, (*i.e.*, the Modeling Report and the Risk Assessment Reports). The Phase 3 Report shall be written in accordance with the Guidance for Conducting Remedial Investigations/Feasibility Studies under CERCLA, OSWER Directive 9355.3-01, October 1988, Interim Final (or latest revision) and

Guidance for Data Usability in Risk Assessment, (EPA/540/G-90/008), September 1990 (or latest revision). Respondents shall refer to the RI/FS Guidance for an outline of the report format and contents.

A. Draft Phase 3 Report

In accordance with the schedule in the approved RI/FS Work Plan, Respondents shall submit a draft Phase 3 (RI) Report.

B. Final Phase 3 Report

If EPA disapproves of or requires revisions to the Draft Phase 3 Report, in whole or in part, Respondents shall amend and submit to EPA a Final Phase 3 Report that is responsive to EPA's written comments in accordance with Section XI of the Settlement Agreement.

## IX. TASK VIII - DEVELOPMENT AND SCREENING OF REMEDIAL ALTERNATIVES

Based on the results of the Task IV analysis of technologies, identification of potential remedial alternatives and the site characterization available at the end of Phase 2, and taking into account any actions being developed or undertaken based on the findings of the IRM Letter Report, Respondents shall begin to develop and evaluate a range of appropriate risk management options that at a minimum ensure protection of human health and the environment. This range of alternatives should include options in which treatment is used to reduce the toxicity, mobility, or volume of wastes, but varying in the types of treatment, the amount treated, and the manner in which long-term residuals or untreated wastes are managed; options involving containment with little or no treatment; options involving both treatment and containment; options including monitored natural recovery; and a no-action alternative. In preparing the range of alternatives, the Respondents shall supplement the RI/FS guidance with materials such as the "Contaminated Sediment Remediation Guidance for Hazardous Waste Sites", (U.S. EPA, Office of Emergency and Remedial Response, December 2005). To the extent that portions of the BCSA are relatively distinct, the combinations of remedial alternatives will vary among study segments. The following activities will be performed as a function of the development and screening of remedial alternatives.

A. Development and Screening of Remedial Alternatives

1. Develop General Response Action

Respondent shall develop general response actions for each medium of interest defining containment, treatment, excavation, dredging, monitored natural recovery or other actions, singly or in combination or in a phased sequence to satisfy the remedial action objectives (RAOs). The RAOs will be developed to take into account relative risks of COCs and other stressors, as well as ensure that

cleanup objectives for sediment are clearly tied to overall risk management goals.

2. Identify Areas or Volumes of Media

Respondent shall identify areas or volumes of media to which general response actions may apply, taking into account requirements for protectiveness as identified in the remedial action objectives. The chemical, physical and biological characterization of the Berry's Creek Study Area will also be taken into account.

3. Assemble and Document Alternatives

Respondents shall assemble selected representative technologies into alternatives for each affected medium, study area segment, or operable unit.

Together, all of the alternatives will represent a range of treatment and containment and monitoring combinations that will address either the Site or the operable unit(s) as a whole. A summary of the assembled alternatives and their related action-specific ARARS will be prepared by Respondents for inclusion in a technical memorandum.

The reasons for eliminating alternatives during the preliminary screening process must be specified.

4. Refine Alternatives

Respondents shall refine the remedial alternatives to identify contaminant volume addressed by the proposed process and sizing of critical unit operations as necessary. Sufficient information will be collected for an adequate comparison of alternatives. Preliminary remediation goals (PRGs) for each chemical (or combination of chemicals, which may be presented as an index or combined measure) in each medium will also be modified as necessary to incorporate any new risk assessment information presented in the baseline risk assessment report. Additionally, action-specific ARARs will be updated as the remedial alternatives are refined.

5. Conduct and Document Screening Evaluation of Each Alternative

Respondents may perform a final screening process based on short and long term aspects of effectiveness, implementability, and relative cost. Generally, this screening process is only necessary when there are many feasible alternatives available for detailed analysis. If necessary, the screening of alternatives will be conducted to assure that only the alternatives with the most favorable composite evaluation of all factors are retained for further analysis. As appropriate, the screening will preserve the range of treatment and containment and monitoring alternatives that was initially developed. The range of remaining alternatives will

include options that use treatment technologies and permanent solutions to the maximum extent practicable. In addition, in recognition of the large size of the BCSA, the multiple current and past sources of stressors, and likelihood of a long period of remedy implementation and monitoring, the Respondents will develop an adaptive site management approach to the remedy that incorporates a long term monitoring program to provide a continuing measure of the performance of the remedy.

B. Development and Screening of Alternatives Deliverables

Within thirty (30) days after EPA's approval of the Phase 2 Report, Respondents shall: (1) upon EPA's request, make a presentation to EPA and the State identifying the remedial action objectives and summarizing the development and preliminary screening of remedial alternatives and any recommendations regarding Treatability Studies, and (2) prepare and submit a Development and Screening of Remedial Alternatives technical memorandum summarizing the work performed in, and the results of, each task above, including an alternatives array summary. The memorandum shall also summarize the reasoning employed in screening, arraying alternatives that remain after screening, and identifying the action-specific ARARs for the alternatives that remain after screening. If required by EPA's comments, these remaining alternatives will be modified by the Respondents to assure that a complete and appropriate range of viable alternatives are identified and considered in the detailed analysis. This deliverable will document the methods, rationale, and results of the alternatives screening process and any decision on Treatability Studies.

C. Detailed Analysis of Remedial Alternatives

Upon EPA's approval of the Baseline Risk Assessment (following completion of Phase 3 Site Characterization), or after EPA's approval of Respondents' Treatability Study Evaluation report (if undertaken), whichever is later, Respondents shall initiate the detailed analysis of remedial alternatives to provide EPA with the information needed to allow for the selection of a remedy for the Berry's Creek Study Area/the Site.

1. Detailed Analysis of Alternatives

Respondents shall conduct a detailed analysis of alternatives which will consist of an analysis of each option against a set of nine evaluation criteria and a comparative analysis of all options using the same evaluation criteria as a basis for comparison.

2. Apply nine criteria and document analysis

Respondents shall apply the first seven of the nine evaluation criteria described in the National Contingency Plan (NCP), 40 CFR Part 300,to the assembled remedial alternatives to ensure that the selected remedial alternative will be protective of human health and the environment; will be in compliance with, or include a waiver of, ARARS; will be cost-effective; will utilize permanent

solutions and alternative treatment technologies, or resource recovery technologies, to the maximum extent practicable; and will address the statutory preference for treatment as a principal element. The nine evaluation criteria include: (1) overall protection of human health and the environment; (2) compliance with ARARs; (3) long-term effectiveness and permanence; (4) reduction of toxicity, mobility, or volume; (5) short-term effectiveness; (6) implementability; (7) cost; (8) state (or support agency) acceptance; and (9) community acceptance. Criteria 8 and 9 will be considered by EPA after the RI/FS Report and the Proposed Plan have been released to the general public for comment.

For each alternative, Respondents should provide: (1) a description of the alternative that outlines the environmental management strategy involved, including any adaptive management/monitoring sequences, and identifies the key ARARs associated which each alternative, and (2) a discussion of the individual criterion assessment.

3. Compare Alternatives and Document the Comparison of Alternatives

Respondents shall perform a comparative analysis between the remedial alternatives. That is, each alternative will be compared against the others using the evaluation criteria as a basis of comparison. Identification and selection of the preferred alternatives are reserved by EPA. Respondents shall present the results of the comparative analysis in a work session with EPA.

4. Detailed Analysis Deliverables

Within thirty (30) days of the Respondents' notification of EPA of the completion of the detailed analysis, Respondents shall upon EPA's request, make a presentation to EPA and the State identifying the remedial action objectives and summarizing the detailed analysis of remedial alternatives. Respondents shall submit a draft FS report to EPA for review and approval as provided in Task X, below. Once EPA's comments have been addressed by the Respondents to EPA's satisfaction, the final FS report may be bound with the final RI report.

## X. TASK IX - TREATABILITY STUDIES

Treatability testing will be performed by the Respondents, based on the Respondents review of FS data needs or at EPA's request, to assist in the detailed analysis of alternatives. In addition, if applicable, testing results and operating conditions will be used in the detailed design of the selected remedial technology. The following activities will be performed by the Respondents.

A. Conduct Literature Survey and Determine the Need For Treatability Testing

Respondents shall conduct a literature survey to gather information on performance, relative costs, applicability, removal efficiencies, operation and maintenance ("O&M")

requirements, and implementability of candidate technologies. If practical candidate technologies have not been sufficiently demonstrated, or cannot be adequately evaluated for this Site on the basis of available information, treatability testing will be conducted. Where it is determined by EPA that treatability testing is required, unless the Respondents can demonstrate to EPA's satisfaction that they are not needed, the Respondents shall submit a Statement of Work to EPA outlining the steps and data necessary to evaluate and initiate the treatability testing program.

B. Evaluate Treatability Studies

Once a decision has been made to perform treatability studies, Respondents and EPA will decide on the type of treatability testing to use (e.g., bench versus pilot). Because of the time required to design, fabricate, and install pilot scale equipment as well as perform testing for various operating conditions, the decision to perform pilot testing should be made as early in the process as possible to minimize potential delays of the FS. To assure that a treatability testing program is completed on time, and with accurate results, Respondents shall either submit a separate treatability testing work plan or an amendment to the original site work plan for the Site for EPA review and approval.

C. Treatability Testing and Deliverables

The deliverables that will be required if treatability testing is conducted, in addition to the memorandum identifying candidate technologies, shall include a treatability testing statement of work, a work plan, a sampling and analysis plan, and a final treatability evaluation report. EPA may also require a treatability study health and safety plan, where appropriate.

If EPA determines that treatability testing is required and so notifies Respondents in writing, Respondents shall, within twenty-one (21) days thereafter, submit to EPA a Treatability Testing Statement of Work.

D. Treatability Testing Work Plan

Within thirty (30) days of written EPA approval of the Treatability Testing Statement of Work, Respondents shall submit a draft Treatability Testing Work Plan, including a schedule. If EPA disapproves of or requires revisions to the Draft Treatability Testing Work Plan, in whole or in part, Respondents shall amend and submit to EPA a Final Treatability Testing Work Plan that is responsive to EPA’s written comments in accordance with Section XI of the Settlement Agreement.

Respondents shall prepare a Treatability Testing Work Plan or amendment to the original site Work Plan for the Site for EPA review and approval describing the background of the Site, remedial technology(ies) to be tested, test objectives, experimental procedures, treatability conditions to be tested, measurements of performance, analytical methods, data management and analysis, health and safety, and residual waste management. The DQOs for treatability testing should be documented as well. If pilot scale treatability

testing is to be performed, the Pilot-scale Work Plan will describe pilot study design and start-up, pilot study operation and maintenance procedures, operating conditions to be tested, a sampling plan to determine pilot study performance, and a detailed health and safety plan. If testing is to be performed off-site for the Site, Respondents shall address all necessary permitting requirements to the satisfaction of appropriate authorities.

E. Treatability Study QAPP

If the original QAPP is not adequate for defining the activities to be performed during the treatability test, a separate Treatability Testing QAPP or amendment to the original QAPP for the Site will be prepared by the Respondents for EPA review and approval. Task 1 of this Statement of Work provides additional information on the requirements of the QAPP.

Within thirty (30) days of the identification by EPA of the need for a separate or revised QAPP, Respondents shall submit to EPA a revised QAPP, as appropriate. If EPA disapproves of or requires revisions to the Draft Treatability Testing QAPP, in whole or in part, Respondents shall amend and submit to EPA a Final Treatability Testing QAPP that is responsive to EPA's written comments in accordance with Section XI of the Settlement Agreement.

F. Treatability Study Health and Safety Plan

If the original Health and Safety Plan is not adequate for defining the activities to be performed during the treatment tests, a separate or amended HSP will be developed by the Respondents. Task 1 of this statement of work provides additional information on the requirements of the HSP. EPA does not "approve" the treatability study HSP.

G. Treatability Study Evaluation Report

Respondents shall submit a Treatability Study Evaluation Report (TSER) to EPA. If EPA disapproves of or requires revisions to the Draft Treatability Study Evaluation Report, in whole or in part, Respondents shall amend and submit to EPA a Final Treatability Study Evaluation Report that is responsive to EPA's written comments in accordance with Section XI of the Settlement Agreement.

Following completion of treatability testing, the Respondents shall analyze and interpret the testing results in a TSER to EPA. Depending on the sequences of activities, this report may be a part of the RI/FS report or a separate deliverable. The report will evaluate each technology's effectiveness, implementability, cost and actual results as compared with predicted results. The report will also evaluate full scale application of the technology, including a sensitivity analysis identifying the key parameters affecting full-scale operation or application of the technology.

## XI. TASK X – FEASIBILITY STUDY REPORT

A. Respondents shall prepare a Feasibility Study Report, consisting of a detailed analysis of alternatives and a cost-effectiveness analysis, in accordance with the National Contingency Plan (NCP), 40 CFR Part 300, as well as the most recent guidance. Within thirty (30) days of EPA's acceptance of the Task VIII C. 4 presentation to EPA, Respondents shall submit to EPA a Draft FS report which reflects the findings in the approved Baseline Risk Assessment and subsequent risk analysis of remedial alternatives. Respondents shall refer to the RI/FS Work Plan and the RI/FS Guidance and the SOW for report content and format. Within fourteen (14) days of submitting the draft FS report, unless extended by EPA, Respondents shall make a presentation to EPA and the State at which Respondents shall summarize the findings of the draft FS report and discuss EPA's and the State's preliminary comments and concerns associated with the draft FS report. If EPA disapproves of or requires revisions to the Draft Feasibility Study Report, in whole or in part, Respondents shall amend and submit to EPA a Final Feasibility Study Report that is responsive to EPA's written comments in accordance with Section XI of the Settlement Agreement.

B. Respondents shall prepare a draft FS report for EPA review and comment. The FS report shall contain the following:

1. Summarize Feasibility Study objectives

2. Summarize remedial action objectives

3. Articulate general response actions

4. Identification and screening of remedial technologies

5. Remedial alternatives description

6. Detailed analysis of remedial alternatives

7. Summary and conclusions

Respondents' technical feasibility considerations shall include the careful study of any problems that may prevent a remedial alternative from mitigating site problems. Therefore, the site characteristics from the RI must be kept in mind as the technical feasibility of the alternative is studied. Specific items to be addressed are monitoring to support decision points, reliability (operation over time), safety, operation and maintenance, ease with which the alternative can be implemented, and time needed for implementation.

ATTACHMENT A

REFERENCES FOR CITATION

The following list, although not comprehensive, comprises many of the regulations and guidance documents that apply to the RI/FS process:

The National Hazardous Substance and Oil Pollution Contingency Plan, 40 CFR 300 *et seq*.

Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA, U.S. EPA, Office of Emergency and Remedial Response, October 1988, OSWER Directive No. 9355.3-01

"Contaminated Sediment Remediation Guidance for Hazardous Waste Sites," U.S. EPA, Office of Solid Waste and Emergency Response, December 2005, OSWER Directive No. 9355.0-85

Interim Guidance on Potentially Responsible Party Participation in Remedial Investigation and Feasibility Studies, U.S. EPA, Office of Waste Programs Enforcement, Appendix A to OSWER Directive No. 9355.3-01.

Guidance on Oversight of Potentially Responsible Party Remedial Investigations and Feasibility Studies, U.S. EPA, Office of Waste Programs Enforcement, OSWER Directive No. 9835.3.

A Compendium of Superfund Field Operations Methods, Two Volumes, U.S. EPA, Office of Emergency and Remedial Response, EPA/540/P-87/001a, August 1987, OSWER Directive No. 9355.0-14.

EPA NEIC Policies and Procedures Manual, May 1978, revised November 1984, EPA-330/9-78-001-R.

Data Quality Objectives for Remedial Response Activities, U.S. EPA, Office of Emergency and Remedial Response and Office of Waste Programs Enforcement, EPA/540/G-87/003, March 1987, OSWER Directive No. 9335.0-7B.

"Uniform Federal Policy for Implementing Quality Systems (UFP-QS)," EPA-505-F-03-001, March 2005

"Uniform Federal Policy for Quality Assurance Project Plans (UFP-QAPP)," Parts 1, 2 and 3, EPA-505-B-04-900A, B and C, March 2005

Guidelines and Specifications for Preparing Quality Assurance Project Plans, U.S. EPA, Office of Research and Development, Cincinnati, OH, QAMS-004/80, December 29,1980.

EPA Requirements for QAPPs for Environmental Data Operations, U.S. EPA, Office of Emergency and Remedial Response, QA/R-5, October 1998.

Interim Guidelines and Specifications for Quality Assurance Project Plans, U.S. EPA, Office of Emergency and Remedial Response, QAMS-005/80, December 1980.

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